"Pull-out Section"

~~(Pages 7-80 are unclassified, For Official Use Only, and may be removed for wider dissemination.)~~

Removed by direction of HQ AFSEC/JA, February 2019

NUCLEAR SAFETY

VOLUME 52

SEPTEMBER-OCTOBER 1966

THE SUPERVISOR

Every aspect of safety in the USAF has a direct effect on operational capability. The supervisor, therefore, becomes a vital link in the accident/incident/deficiency prevention program since safety is an integral part of his normal duties. The supervisor who applies the principle that safety increases operational effectiveness is a key contributor to Nuclear Safety. Normally, he is the most knowledgeable individual present during weapon operations. He is, therefore, best equipped to insure that all associated activities are given optimum safety consideration.

The supervisor must insure that only qualified and reliable personnel perform the various weapon functions. Moreover, that these individuals are mentally and emotionally capable of carrying out their individual responsibilities. As the person most frequently in direct contact with these individuals, he is in the best position to make daily observations. *(AFM 122-1)*

Removed by direction of HQ AFSEC/JA, February 2019

CHARLIE SCHULTZ AND THE TRIPLANE

(The ADC ORI Team Chief, Col Jimmy J. Jumper, continues to write interesting and valuable articles containing material useful to people in the Nuclear Safety field as well as other safety activities. The following article appeared in the April 1966 issue of "Interceptor."—Ed.)

Somebody once asked us how come we inspect safety programs on fighter unit ORIs. Our answer was the obvious one. We want to make sure that combat resources aren't being needlessly wasted or exposed to risk. We make kind of a big thing of unit safety surveys when we inspect, and the other day we heard a story that justified our interest. It told how the whole thing began.

Back in the days of the Great War, Manfred Von Richthofen was a pretty well known fella—shot down 80 planes, had a catchy name, long scarf—everything going for him! But, when Manfred was the jagdstaffel new guy, he had trouble with his landings. Fact was, he couldn't land worth sour apples. Well, nobody hears much about him but there was a flying safety officer in Manfred's outfit named Charlie Schultz, and Charlie was worried about Manfred. After watching Manfred wipe out his second Eindeker in as many days, Charlie wrote the Baron a letter. Charlie had a flair for colorful language. *"Manny Baby: You fly like old people play soccer. This may come as a shock to you, sweetheart, but you're supposed to round out a Fokker before the wheels come into the cockpit. Now, I'm a reasonable guy, Manny, but you know what a grouch the oberkommander is—one more bash this year, baby, and old Charlie goes back to the Russian front. Now, gimme a break, Manny. Please start your roundouts higher! Charlie."*

Now, ole Charlie didn't know it, but he had the start of a pretty good safety survey there. He saw a problem, wrote it down, and sent it to the guy who could do something about it. He got a quick response too!

The Baron had a flair for blunt language! *"Schultz: Cool it, fink: .... Call me "Manny baby" one more time and you'll wish you were at the Russian front. Der Baron."*

Well, Charlie—being a resourceful fellow who hated cold weather—when his survey didn't get results, did the right thing again. He took follow-up action, this time enlisting the aid of a technical expert. He called up his old friend, Anthony Fokker. The phone call sounded something like this:

— Hello! Tony baby?

— This is Charlie—Charlie Schultz!

— No wait, Tony, don't hang up—there might be a contract in it for you.

— All right, Tony, I'm sorry I called you a crackpot when you told the staff you could make a machine gun that would fire through the propeller—OK?

— Listen, Tony, I got a problem. We got this new guy in the squadron named Richthofen. Yeah, you know, the one with the long scarf. Calls himself the Red Baron—big deal!

— Yeah. Well, anyway, this nut wipes out the landing gear about twice a week when he lands, but he's a big shooter and the boss wants to keep him around. So, I was wondering, Tony, if you could come up with some kind of gadget that would help get this screwball on the ground.

— Oh? You're already working on something?

— An airplane with what?

— With three wings? Oh, you are a card, Tony. Yes, that's very funny, but seriously, Tony, I'm in a jam.

— Oh, I see, you are serious.

— You say that third wing will give him the extra lift he needs to round out? Uh, Tony—you're not back on that cheap Dutch wine again, are you?

— I see. Well, if anybody can make it fly, Tony Baby, you're the man.

— You're going to call it what? The Fokker Triplane, huh?

— Yeah, that's great Tony. I mean we wouldn't want to call it the Fokker monoplane, now, would we?

— Well, listen, Tony, when you finish this thing, why don't you paint it red? That boob's gonna get blood all over it on his first landing anyway.

Now, everybody knows how well the Baron and the Triplane did, but very few historians realize that

Well . . . would you believe that materiel failure was a CONTRIBUTORY cause?

it all came about as a result of Charlie Schultz's safety survey.

We get enthused about unit safety because being itinerant gumshoes ourselves, we felt that some type of self-inspection is needed in the squadrons. The safety survey is sort of a nice guy's inspection. Properly done, it benefits everybody.

We harass the safety guy on every ORI. Usually, the nuts-and-bolts parts of the safety programs, i.e., reporting, nuc-safe training and so forth, are pretty much standard. But, local surveys, which are the backbone of the safety program at some units, are given only lip service at others. It may be coincidence, but the outfits that use safety surveys effectively almost invariably have safer operations.

We're not going to tell you how to do it at your outfit—that's not our line of work. But, here's one good system we've seen work.

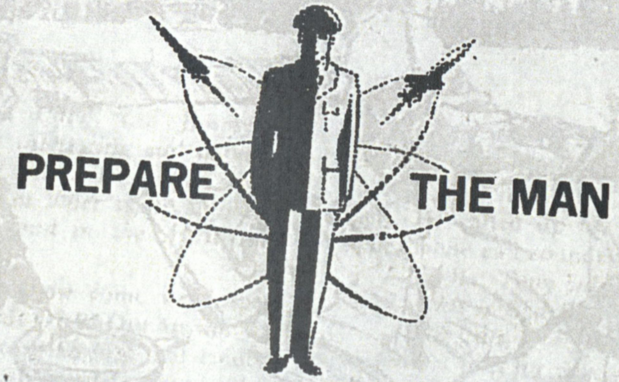
First, the safety officer sets up a schedule. He looks at a different element of the unit each month or at whatever time period he thinks is appropriate. He may, for example, decide to do the storage site in January. If so, he lets the OIC know about it well in advance.

Next, he makes up some kind of check list using publications that pertain to the function he's looking at. He uses inspection reports such as ORI/CI Blue Books as another guide for trouble-shooting. He gets expert help if he needs it in areas he's unfamiliar with, such as civil engineering or security. Then, he conducts the survey. If he's prepared, it doesn't take very long.

His next step is to prepare a brief report and send a copy to the section surveyed for corrective action. A copy also goes to the commander of any other agency that has to lend a hand to correct a gig. Finally, he makes a follow-up visit to insure that the gigs have been taken care of.

This sort of thing keeps everybody happy. The guy being surveyed is happy because it helps pinpoint problems that maybe he's too busy to notice; the commander's happy because he gets in-house corrective action. We're happy because our reports are shorter; and safety officers like Charlie Schultz are happy because they don't get sent to places like the Russian front.

By the way, we made up some of that story. There never was a guy named Richthofen—but Charlie Schultz was real.



TRAINING NEWS

NUCLEAR SAFETY OFFICER (NSO)

The commander should assign an NSO as either a special staff officer with whom he deals directly or within a Directorate of Safety which in turn is directly responsible to the commander. Past experience shows that when the NSO reports directly to the commander, fewer accidents/incidents/deficiencies occur. The higher the qualifications of the safety officer, the greater his potential for reducing the number of accidents/incidents/deficiencies. The assignment of highly qualified NSOs down through wing level or a level commensurate with the nuclear responsibilities of the command/wing — reporting directly to the commander's safety staff officer — is a basic concept of the USAF accident prevention philosophy. Consideration should also be given to the assignment of full-time NSOs at subordinate organizations, where warranted, particularly those in isolated locations.

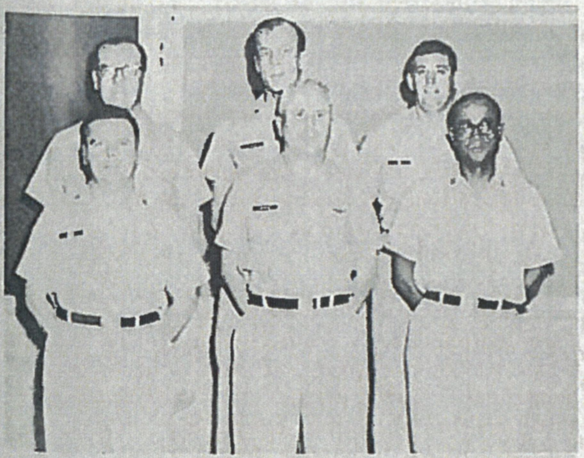
Today's professional NSO is an expert who aids the commander by identifying and analyzing potential accident areas, and by recommending necessary corrective action. The NSO's duties normally are considered as staff duties, and his office should not be an action agency. If he were required to participate routinely in each weapon movement, loading, maintenance, function, crew briefing, etc., his efforts would be diluted and rendered ineffective. **(AFM 122-1)**

LTTC NSO CLASSES

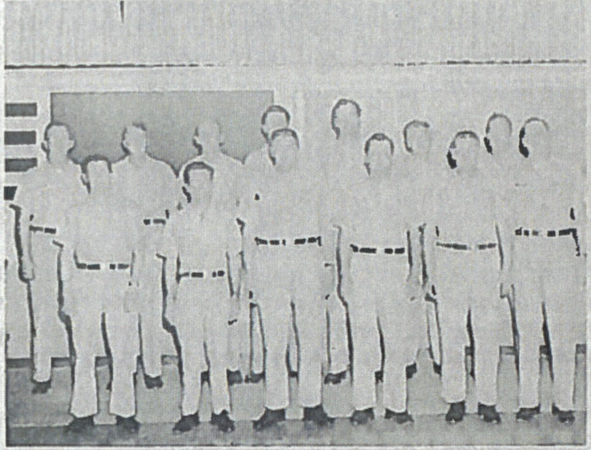
The second TAC Troop Carrier Class graduated from the Nuclear Safety Officer Course at Lowry AFB on 21 June 1966. Capt Donne D. Viau of the 316th TCW at Langley AFB was the honor graduate.

The field trip was conducted at the 813th Air Division (TAC) at Forbes AFB. Maj. K. E. Quinlan, the Chief of Safety at Forbes AFB, as well as being a class member, provided support for the class during its stay. According to the NSO Course instructors, the facilities, cooperation, and assistance provided were nothing short of outstanding. They also said that they sincerely appreciated the high degree of interest and motivation toward Nuclear Safety exhibited by the members of the class.

1st Defense Atomic Support Agency NSO Class, Lowry AFB. L. to r. Col E. Miller (Guest Graduation Speaker); Capt F. C. Lawler (USA); Capt R. L. Scott (USA); 2d Lt B. C. Head (USA); 1st Lt W. H. Hora (USAF); Lt Col T. M. Scott (USAF); 1st Lt C. W. Schoop, Jr (USAF); Maj R. Mace (USAF); Capt. D. A. Pearse (USAF); Maj W. W. DeLorme (USAF); CWO-4 H. S. Pickerill (USN); Lt H. E. Staples (USN).



2nd TAC (Troop Carrier) Nuclear Safety Officers Class. Lowry AFB. L. to r. (first row): Capt J. J. Ruddy; Maj K. E. Quinlan; Capt C. F. Mourning. (Second row): Capt K. M. Goudielock; Maj W. Langer; Capt D. D. Viau (Honor Graduate).



2nd CONAC Nuclear Safety Officers Course, Lowry AFB. L. to r. (first row): Capt D. P. Lemme; Maj R. S. Briggs; Maj C. D. Mullins (Honor Graduate); Maj C. E. Horton; Maj G. D. Sharpe; Maj W. R. Haeflinger. (Second row): Maj R. C. Baquley; Maj R. T. Knight; Maj D. L. Henry; Maj I. D. Richardson; Maj H. D. Eddelman; Maj G. F. Cullen; Maj I. A. Nicholson.

Fifth AF Hosts PACAF NSO Course

Headquarters Fifth Air Force was host to the Pacific Air Force Nuclear Safety Officer Course (OTS-1955-6) from 14 February through 5 May 1966. The course was conducted by four instructors from Lowry AFB, Colorado. Under the program, four classes, each consisting of approximately 15 students were given training and instructions in Nuclear Safety procedures at Johnson AB, Japan. This course of instruction is part of an Air Force-wide program to prepare personnel in becoming better qualified in all phases of specialized safety functions.

Maj Gen Fred J. Ascani, Vice Commander, Fifth Air Force, was the guest speaker at the graduation ceremonies held for the first class. General Ascani stated:

". . . the need for a sound and well-managed Safety Program at all levels of command has been accepted by the Air Force . . . the conflict in' Southeast Asia and its conventional aspects has caused some people to advance the theory that our Safety Program can be placed in a secondary role. Quite to the contrary, the drain on our air power to support Southeast Asia has placed renewed emphasis on the requirement for a quality safety program.

"We must insure that our operations are well planned and that we are capable of supporting general war plans with less aircraft and fewer people. This requirement has placed additional pressure on commanders, supervisors and individuals to increase their efficiency and awareness of safety."

At the conclusion of his address, General Ascani offered these challenges to the graduating students: "First, know your unit's mission and how the safety program fits into each segment of the mission. Second, know the people who support the mission. Third, be honest with your commander in pointing out weaknesses within the unit's safety plan. Finally, develop and sustain a positive attitude as to the methods in which the mission can be performed, problems can be resolved and still support the intent and purpose of our safety rules."

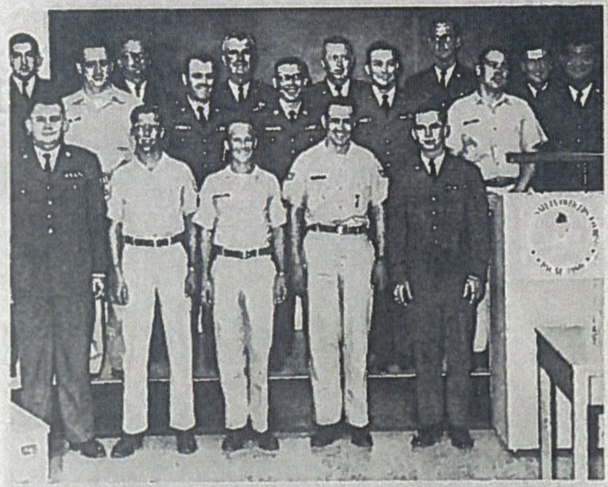
The three officers and one NCO which made up the team of instructors were: Capt Ronald E. Christensen, team chief, and his three able assistants, 1st Lt William A. Begalke, Jr, Lt. Robert S. Kase, and TSgt Robert D. Schultz.

Honor graduates and second in class standings were each given a pen and pencil set in recognition of their outstanding performances. In addition, each individual was given a certificate of completion attesting to their effort and ability to complete the course of instruction.

1st PACAF Nuclear Safety Officers Course. L. to r. (first row): SMSgt G. M. Hay; Capt J. H. Conover; Lt T. S. Moughon, Jr; CDR W. C. Metcalf; Capt D. W. Foshee; Capt R. Call, Jr; Capt J. D. Miller; Lt L. E. Wirth. (Second row): MSgt T. J. Mullaney; Capt R. G. Wise; Maj L. Tarbutton; Capt E. V. Richardson; Maj H. M. Stout; TSgt F. E. Slater; Lt J. W. Amrine, Jr.

2nd PACAF Nuclear Safety Officers Course. L. to r. (first row): Capt R. E. Maher; Capt H. Waller; MSgt H. J. Gilliland; Capt R. H. Moon; CWO L. Dumond; CMSgt J. S. Scott. (Second row): Capt H. F. Johnson; SSgt D. Loveall; Capt R. L. Brooks; Lt B. Wolf; SMSgt J. R. Patterson; G. Boozer (Civ).

3rd PACAF Nuclear Safety Officers Course. R. to l. (first row): Lt R. C. McKee; Capt W. J. Decanio; Lt Col J. P. Anderson; Capt F. G. Rosenbaum. (Second row): Lt J. A. Gallagher; Capt R. J. Stratton; Lt J. R. Shafer; Capt W. W. Boys.



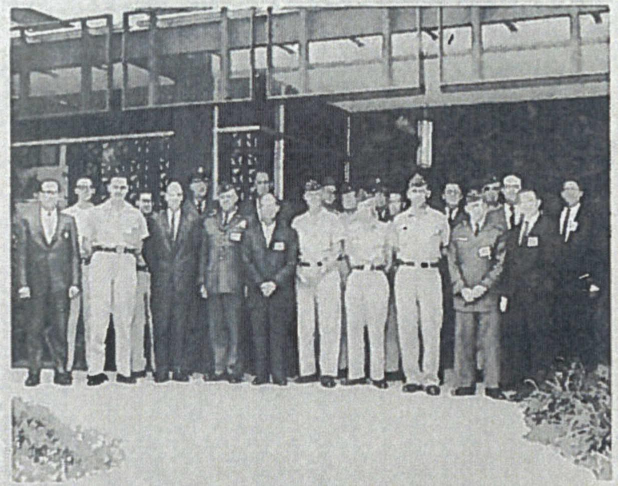
4th PACAF Nuclear Safety Officers Course. L. to r. (first row): SSgt N. R. Skeeters; MSgt F. E. Winters; SSgt J. E. Walls; SSgt C. R. Hadley; Lt J. R. McGowan. (Second row): SSgt S. Pratt; SSgt R. E. Rogers; SSgt T. E. Jessap; Lt R. E. Walden; Lt S. P. Kirchenbaum; Capt H. K. Nemato. (Third row): Lt R. G. Stephenson; Capt G. Arthur; Maj J. J. O'Connor; Maj R. B. McCann; Capt R. J. Eisenrich; TSgt W. E. Porter.

AUTONETICS COURSE

The Autonetics Division of North American Aviation Corporation conducted an LGM-30F Computer Course for members of the Nuclear Weapon System Safety Group (NWSSG) and its technical advisors the week of 18 April 1966. The course was conducted at the Anaheim North American plant in California.

The course was designed to provide NWSSG members and project engineers with information on programming the Minuteman computer. In the LGM-30F system, the airborne computer is used to process weapon system status and command and control signals—key considerations in Nuclear Safety analyses conducted by the NWSSG.

In addition to the Air Force commands concerned the course was attended by representatives from Field Command/Defense Atomic Support Agency, the Atomic Energy Commission, and Sandia Corporation.



NWSSG MEMBERS AND TECHNICAL ADVISORS ATTEND AUTOMETICS COURSE. L. to r.: Donald Southwell; 1st Lt George W. Taylor; Capt David E. Griffin; Maj Kenneth R. Bonnett; Erwin G. Klink; Lt Col Randall S. Kane; Lt Col John W. Waller; Robert L. Hilty; Paul R. Smith; Maj William L. Kincaid; Capt Wilbur D. Dice; Maj Gerald E. Weinstein; Lt Col Harlan P. Ross III; Lt Col Harvey A. Cook, Jr; Maj Louis A. Pendergrass; Maj Wendell E. Cosner; Maj James V. Ruzic; Capt Raymond E. Siferd; Lt Col Howard L. Harris, Jr; Richard B. Craner; Thomas D. Clark; Valdean Watson.

TRAINING NEWS

SAC NUCLEAR SAFETY CLASSES

SAC Class 66-J, Nuclear Safety Operations Course, 130002. L. to r. (first row): MSgt G. W. Skidmore; CMSgt E. L. Ryles; MSgt R. A. Renn; Capt T. H. Jones; SSgt D. W. Statton; 1st Lt J. W. Lundy; MSgt J. J. Isler. (Second row): MSgt J. C. Wiggs; CWO-3 A. L. Sales; TSgt H. Thompson; 1st Lt F. Sauer; 1st Lt R. J. Whitney, Jr; CMSgt G. Fisher. (Third row); B. L. Merrill; MSgt W. F. Dermody; Maj R. C. Richards; SSgt J. L. Grise; Capt G. O. Poston. (Fourth row): SSgt P. W. Holmes; 1st Lt B. T. Washington; MSgt W. J. Weaver; TSgt W. E. Gustman.

SAC Class 66-L, Nuclear Safety Operations Course, 130002. L. to r. (first row): 2d Lt J. K. McMahon; TSgt D. W. Foster; 1st Lt F. R. White; TSgt L. G. Wigle; 1st Lt A. L. Livingston; MSgt H. A. Rickard. (Second row); Lt Col C. R. Van Horn; CMSgt E. W. Bush; 2d Lt J. A. Lopez; MSgt F. A. Hulsey; 1st Lt R. A. Webster; 2d Lt R. D. Clark. (Third row): 2d Lt J. D. Isom: CMSgt R. D. Green. CMSgt C. C. Schoolfield; TSgt J. E. Loar; Lt Col B. E. Purdom; SMSgt P. A. Maxwell. (Fourth row): 1st Lt R. F. Hudson; SMSgt J. L. Langford; TSgt B. S. Milene; TSgt H. L. Brown; TSgt D. L. Bowden; MSgt D. O. Nelson.

SAC Class 66-K, Nuclear Safety Operations Course, 130002. L. to r. (first row): Maj J. H. Taylor; Maj R. S. Armstrong; SMSgt J. M. Phillips; 1st Lt A. J. Minker; TSgt M. S. Rahman; 2d Lt R. A. Morris. (Second row): 1st Lt D. G. King; 1st Lt L. S. Wetter; TSgt M. G. Hilman; SMSgt T. J. Owens; 2d Lt L. W. Peterson; TSgt D. E. McNeese. (Third row): CWO-4 M. L. Gootes; TSgt J. C. Hill. Sr; TSgt V. W. Swan; SMSgt C. L. Huffman; TSgt H. T. Hartman; SSgt G. W. Daucet. (Fourth row): Maj J. R. Thomas; 2d Lt H. W. Byars; 2d Lt E. M. Wright; CWO-4 R. W. Myers; 2d Lt K. L. Gerken.

SAC Class 66-M. Nuclear Safety Operations Course. 130002. L. to r. (first row): SSgt G. D. Couch; SSgt H. Humphry; Capt L. O. Dew-hurst; MSgt R. P. Morris; MSgt H. J. Sobeczk. (Second row): MSgt H. R. Sunde; 1st Lt M. T. McAndrews; 2d Lt K. Fortino; Capt E. W. Clark; Maj P. P. Correll. (Third row); 1st Lt G. B. Hays; SSgt E. A. Townsend; TSgt P. T. Moreno; Capt K. A. Carlson; Maj V. H. Arrel (Fourth row): D. A. Cessna (Civ); 1st Lt T. H. Ethridge; Capt A. Paerels, Jr; W. C. Stewart (Civ); TSgt D. L. Larson.

~~FOR OFFICIAL USE ONLY~~

Removed by direction of HQ AFSEC/JA, February 2019

SAC Class 66-N, Nuclear Safety Operations Course (Basic). 130002.
L. to r. (first row). Maj J. W. Jackson; TSgt D. A. Gregg; 1st Lt L. L.
Shoultz; 2d Lt M. R. Burchfiel; TSgt C. A. Clark; SSgt G. G. Bar-
nett. (Second row); 1st Lt F. H. Raymond; CMSgt J. L. Shaw; SSgt
V. L. Veal; 1st Lt T. S. Finn; 1st Lt R. L. Swett; SMSgt G. L. Murray.
(Third row). MSgt P. A. Stockard; 1st Lt D. L. Hatton; Capt T. A.
Bainbridge; MSgt P. G. Cermak; I. R. Brown (Civ); TSgt C. J. Thi-
bodeaux. Fourth row): 2d Lt J. A. Mercer; 2d Lt W. A. Schunk;
1st Lt M. L. Oliver; 1st Lt D. R. Jones; SSgt H. J. Kammerer.

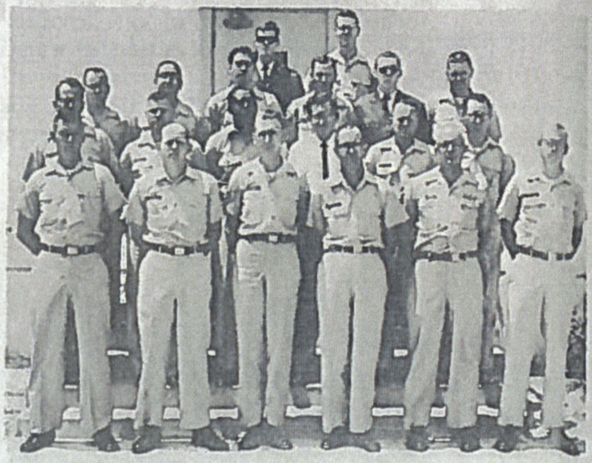
SAC Class 66-P. Nuclear Safety Operations Course (Basic) 130002.
L. to r. (first row): TSgt R. L. Maul; TSgt S. H. Brightful; TSgt
E. B. Hunter; 2d Lt W. C. Stellbrink; 1st Lt D. G Evans; Capt
M E. Speed. (Second row): 1st Lt S. J. Pawelek; Capt W. W. Jones;
1st Lt H. G. Schafer; Maj L. H. Maddox; 1st Lt R. L. Hart; CWO
(W-4) K. R. Teasley. (Third row). SSgt R. C. Weethee; Maj P. T.
Foret; SSgt W. H. Gravely; 1st Lt R. H. Russell, II; 1st Lt C. D.
Loughridge; MSgt F. J. Allein. (Fourth row); SSgt E. G. Scheerer;
1st Lt R. M. Koles.

SAC Class 66-O. Nuclear Safety Operations Course (Advanced).
130008. L. to r. (first row): Maj N. J. Mosteiro; Lt Col N. C. Rogers;
Capt J R. Cole; Capt D. L. Gray; Maj R. B. Paul; Maj W. C. Howell.
Second row): Maj E. Horst; Maj K. H. Hallmark; Maj O. A. Sleep;
Lt Col R. E. Starkey; Maj J. D. Brown. (Third row); 1st Lt F. H.
Raymond; Maj E. E. Miller; Maj P. H. Hewitt; Maj C. E. Torkelson;
Maj J C. Frye Jr; Lt Col G. W. Casey. (Fourth row): Maj E. W.
Kelly, CWO-4 J. C. Courtier. Jr; Maj C. H. Heiser, MSgt C. L.
Canipe; Maj H. F. Long. (Fifth row): Maj A. W. Foahs; 2d Lt
L. L. Parr; Maj J. H. Spearman; Capt T. S. Crouch; Maj W. E.
Burris.

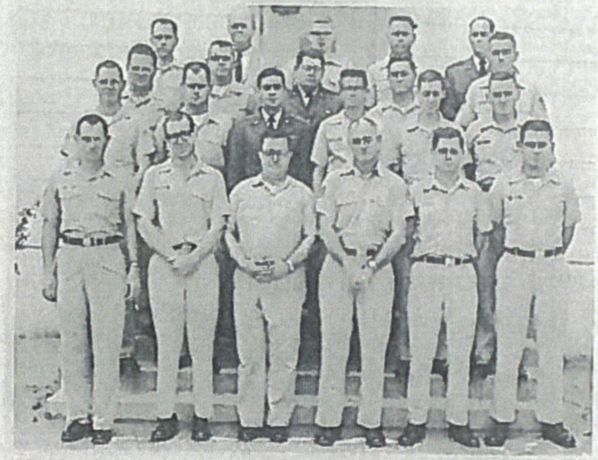
SAC Class 66-Q, Nuclear Safety Operations Course (Basic) 130002.
L to r. (first row) SSgt S. C. Cook, Jr; SSgt J. E. Simms; 1st Lt
S. L. Arey Jr, SMSgt J. H. Grass; Lt Col D. D. Chacey; 1st Lt
J. E. Quigley. (Second row). Lt Col H. A. Dafler; TSgt R. D. Hill;
2d Lt P. H. Shaefer; 1st Lt R. Groll; SSgt B. L. Neal; 1st Lt J. F.
Schang. (Third row): SSgt E. A. Gretchner; 1st Lt W. D. Ross;
1st Lt A. R. L. Schmidt; Maj C. C. Gaskins; 1st Lt P. E. Deutschle;
Lt Col R. E. Statham. (Fourth row): SSgt E. R. Fortin; TSgt C. E.
Griswold; TSgt B. D. Ramsey; SSgt D. L. Spencer; V. Allen, Jr.
(Civ); CMSgt A. S. Merriman.

TRAINING NEWS

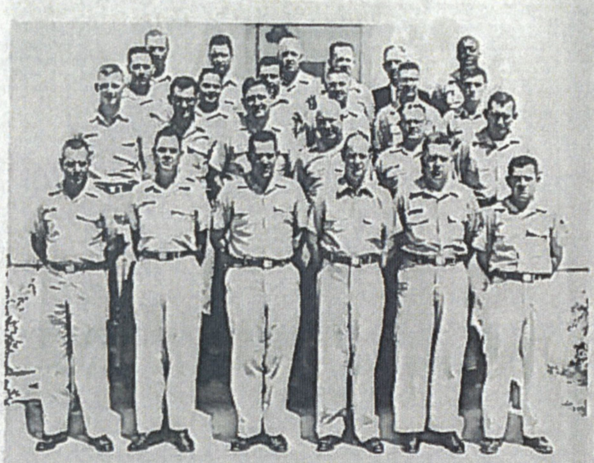
SAC Class 66-R, Nuclear Safety Operations Course (Basic) 130002. L. to r. (first row): MSgt J. A. McCoy; MSgt R. H. Haynes, Sr; TSgt R. L. Lindsey; Capt J. S. Kochell; Maj R. H. Lewis; 1st Lt R. B. Dow. (Second row): Lt Col J. H. Cannon, Jr; 1st Lt J. E. Tucker; Maj R. J. Kalnok; Maj J. German; Lt Col L. C. Winhom, Jr; 2d Lt J. L. McMahon. (Third row): SMSgt P. C. Skidgel; TSgt B. E. Reynolds; CWO-W3 G. W. Knapp; 1st Lt W. C. Janu; MSgt G. Crotte; J. L. Marr (Civ). (Fourth row): 2d Lt R. A. Roadarmel; TSgt R. W. Beaman; TSgt E. J. Radzvilowicz; SSgt R. J. Nettles; CMSgt L. W. Bainbridge; MSgt J. T. Wilson.



SAC Class 66-T, Nuclear Safety Operations Course (Basic) 130002. L. to r. (first row): SSgt J. M. Powlas; TSgt C. Blair; TSgt V. McClenney; Lt Col W. Dodson; Lt Col B. Findley; 1st Lt O. J. Dickherber. (Second row): SSgt T. E. Lacey; Capt W. C. Booth; TSgt E. Davis; C. D. Whitacre (Civ); TSgt W. Black; A1C C. D. Smith. (Third row): 1st Lt D. A. Oelschlager; 1st Lt W. Jue; 2d Lt W. E. Brophy; TSgt W. R. Lovelace; 2d Lt J. L. Moore, III; 2d Lt K. T. Clifford. (Fourth row): 2d Lt D. W. Lang; 2d Lt J. C. Ruckart. (Not shown): SSgt A. G. Madrid; MSgt R. H. Cassidy; CMSgt K. A. Hillary.



SAC Class 66-S, Nuclear Safety Operations Course (Basic) 130002. L. to r. (First row): MSgt R. E. Keune; 1st Lt S. E. Strickler; TSgt L. E. Cortor; MSgt C. D. Mercer; 1st Lt A. Anderson; 1st Lt C. A. Swann. (Second row): SSgt R. A. Smith; SSgt T. R. Mackey; 2d Lt W. F. Honchell; 2d Lt C. O. Liechty; 1st Lt J. H. Bush; MSgt J. T. Nally. (Third row): MSgt D. E. Burch; SSgt R. F. McMahan; 1st Lt M. S. Zickler; Capt G. A. Perkins; SMSgt G. L. Snyder. (Fourth row): TSgt P. C. Vanderslice, Jr; J. R. Dixon (Civ); 2d Lt R. L. Risnes; SMSgt H. D. Swift; Lt Col J. H. Crownover.



SAC Class 66-U, Nuclear Safety Operations Course (Basic) 130002. L to r. (first row): SSgt E. Wanser; CWO-4 W. E. Core; MSgt D. W. Murrill; SSgt L. H. Sand; TSgt C. M. Rowson; CMSgt J. Tirpak. (Second row): 1st Lt S. G. Thompson; SSgt R. F. Patterson, Jr; MSgt R. A. Tygerson; SMSgt W. L. Cox; SSgt J. F. Quirolo; TSgt D. E. Atchley. (Third row): TSgt J. A. Long; SMSgt C. R. Robinson; SSgt A. R. Vigorito; SSgt R. W. Emerson; 2d Lt E. L. Mabry; 2d Lt C. J. Ferriola, Jr. (Fourth row): SMSgt J. W. Brown; SSgt W. G. Taylor; Capt B. L. Henning; SSgt L. W. Jolda; H. F. Cox (Civ); SSgt A. Fowler.

TRAINING NEWS

SAC Class 66-V, Nuclear Safety Operations Course (Basic) 130002. L. to r. (first row): SSgt G. Hess; SMSgt F. R. Giza; TSgt A. H. Williams; SSgt L. Batiste; MSgt R. Hensley; SSgt P. E. Albright. (Second row): TSgt R. D. Miser; SSgt W. R. Cooke; TSgt C. Hafko; TSgt F. K. McVaugh; 1st Lt N. A. Stone; 1st Lt A. L. G. Casey. (Third row): SSgt W. E. Piper; MSgt J. R. Stuart; CMSgt C. A. Cooper; MSgt H. F. Sizemore; 1st Lt T. E. Jackson; CWO L. H. Summers, Jr. (Fourth row): MSgt V. G. Haggard; MSgt E. L. Martin; 1st Lt. C. C. Scheuermann; G. W. Cook (Civ).

Canadian NSO Course

Below is a picture of the first class of the Canadian Nuclear Safety Officers Course held at the Central Officers School, Centralia, Ontario, 2 May 1966. As the *Canadian Forces Nuclear Safety Bulletin* for 31 May 1966 went to press the second NSO course for 14 officers was in progress. Armament, security, and aircrew specialties are represented. Thus many units will soon have additional NSO-trained personnel to assist in maintaining the high standard of Nuclear Safety established to date in the Canadian Forces.

Nuclear Safety Officers Course 6501. L. to r. (first row): S/L T. Nishimura; F/L W. J. Newman (Staff); S/L R. I. McDowell (Staff); F/L T. W. Law (Staff); S/L J. B. Randall. (Second row): F/O H. Acton; F/L J. R. Kerr; F/O R. E. Hanson; F/O R. P. McPhail; F/O J. W. Laforge; F/O D. W. King. (Third row): F/L R., A. M. Kerr; F/L W. D. Johnston; F/L C. R. Bartley; Capt A. M. Zamoyski; F/D W. S. Smith; F/O J. F. Leblanc.

S/L: Squadron Leader (Major)
F/L: Flight Lieutenant (Captain)
F/O: Flying Officer (First Lieutenant)

Are you aware of procedural changes in use since publication of the revised AFR 127-4?

Test on Revised AFR 127-4

(The new AFR 127-4, dated 1 July 1966, has been published and distributed to the field. Although changes from the previous AFR 127-4, as amended, are minor, it behooves all personnel concerned to read the revised regulation. This test highlights some important areas and may provide an answer to questions or errors that appear in some AID reports. Test answers appear on this page.—Ed.)

1. AFR 127-4 requires submission of a "Bent Spear" report in one of the following instances:

a. When a nuclear weapon requires organizational repair or replacement from spares to return the weapon to an operational status.

b. When damage, malfunction, failure or procedural error affecting a nuclear weapon requires return of a shape component to the AEC (or its contractor).

c. When a complete nuclear weapon, warhead section, or a warhead requires return to the AEC (or its contractor) for repair or recertification.

d. Any condition affecting nuclear safety which is considered reportable by a commander.

2. Formal report of investigation is required for each nuclear:

a. Accident, incident, or safety deficiency
b. Accident or incident
c. Safety deficiency
d. Accident. *(The nuclear incident formal report of investigation has been waived by DNS message, AFINSE 00956, 6 Dec. 1965.)*

3. The combined TO 00-35D-54 EUR/AFR 127-4 report may be submitted when an event occurs that would normally require reporting of both the EUR condition and a:

a. Dull Sword
b. Bent Spear
c. Broken Arrow
d. Dull Sword caused by a personnel error

4. Which of the following is correct:

a. Nuclear incident reports are addressed to CSAF (for AFIIS).

b. Nuclear safety deficiency reports are addressed to CSAF (for AFSSS-AE).

c. Nuclear accident reports are addressed to CSAF (for AFSSS-AE).

d. Nuclear accident or incident reports are addressed to CSAF (for AFIIS, AFSSS-G).

5. The delivery system prime air materiel area can be obtained by reference to:

a. TO 00-35D-54
b. AFR 127-4
c. TO 00-5-1
d. TO 00-25-115

6. AFR 127-4 lists certain events not reportable except when the commander considers nuclear safety is affected. Which of the following does qualify as a reportable event:

a. Non-nuclear weapon component shipment received in a damaged or otherwise unsatisfactory condition and the defect is detected before the item is attached to a nuclear component.

b. Nuclear weapons associated equipment defects which are detected during normal inspections and before the item is attached to a nuclear component.

c. Non-nuclear weapon component defect detected during initial inspection and before the item is attached to a nuclear component.

d. Nuclear weapon component shipment received in a damaged or otherwise unsatisfactory condition.

7. Exposure of a weapon/warhead to unusual or severe environment (e.g., flood, earthquake, lightning) which does not result in weapon/warhead damage or test failure requiring rejection and AEC repair is reportable as a:

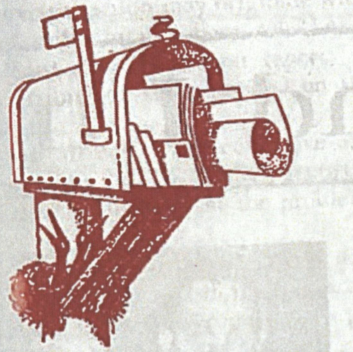
a. Broken Arrow
b. Bent Spear
c. Dull Sword
d. Cracked Lance

8. Radioactive contamination of sufficent magnitude to adversely affect the civilian or military community is properly reported as a:

a. Broken Arrow
b. Bent Spear
c. Dull Sword
d. Cracked Lance

ANSWERS TO AFR 127-4 TEST

1. c; 2. d; 3. a; 4. d; 5. d; 6. d; 7. c; 8. a.



Mail Box

Dear Sir:

We were pleased to read "How to Feel Secure About Your Security" by Col Jimmy J. Jumper, in the Command Line section of Volume 50 of your Nuclear Safety magazine. In particular that part of the article which emphasized the fundamental importance of "people," strikes at the heart of a sound base security program. For no matter how effective and sophisticated the intrusion detection system, security lighting, fencing, sentry dogs, etc., these are only supplemental to the security force. Whether such devices are a primary means of "detecting and alarming" or an assist to sentries, the ultimate "response" to security incidents comes from people. Obviously, if the people are asleep at the switch or fail to respond, the whole system fails.

There are a couple of fine but basic points in Colonel Jumper's article which probably would occur only to people totally immersed in this business of physical security on a day-to-day basis and therefore particularly sensitive to them. First the words" . . . In peacetime, the security folks train for their wartime job . . . ." While true, we feel they leave a lot unsaid regarding the philosophy which we want our security forces to employ especially in the safeguarding of nuclear weapons and nuclear weapon systems. Because the USAF analysis of the clandestine threat associated with general war is that of a coordinated broad scale sabotage attack against initial phase USAF forces we inevitably are faced with the proposition that we are at all times at "war" with the potential saboteurs. That is, in relation to preventing saboteurs from achieving entry to alert aircraft areas or access to nuclear weapons, our system must be constantly effective, perhaps even more so in a so-called "peacetime" environment.

The article scores well on that point when it calls for ". . . a sound and aggressive system in effect 24 hours a day, 365 days a year."

Second, at the risk of belaboring a point on which many words have been written in your magazine and spoken at several Safety Seminars the ". . . enforcement of the 'Two-Man Concept' in critical areas . . . ." while a part of the security man's job is only incidental to his presence in critical areas. As the accompanying cartoon heading the article says so well, security controls at entry points do provide an initial enforcement of the Two-Man Concept. **Inside** these areas, the real effectiveness of the Two-Man Concept is almost totally dependent on the technical personnel for whom the concept was designed originally. We hope our comments will be taken in the spirit with which we offer them. Our thanks again to Colonel Jumper for a comprehensive and interesting article on nuclear security/safety.

Eugene E. Brown
Hq, USAF (AFISL)
Washington DC

Dear Mr. Brown:

We sincerely appreciate your kind words and feel sure Colonel Jumper does too.

Dear Sir:

I made this table using the Decision Logic Table Technique as outlined in AFP 5-1-1. I am using it in my Nuclear Education Program to show the Airman Dispatcher at Base Operations or the Munitions Specialist on the line exactly what each of these mishaps are and with this information he can respond correctly if the need ever arises. In other words, the decision has already been made for him. Thus, in an emergency he need not try to plow through AFR 127-4, changes A and B, and USAFE Supplements to determine what to call what has just happened.

I liked this table so well I thought you might want to see a copy.

Capt Charles W. Ross, IV
Nuclear Safety Officer
7030th Combat Support Wing
APO New York 09012

Dear Captain Ross:

Your table is an excellent idea to provide personnel with basic information from AFR 127-4; however TO 00-35D-54 has a requirement for a materiel deficiency report (EUR). Also, if an event occurs that is properly reportable both as a Dull Sword and as an EUR, the organization may submit a combined report in accordance with paragraph 7a(4)(h) of AFR 127-4. AFR 127-4 has been revised effective 1 July 1966 and should be reviewed by all. Your table has been modified to remind personnel of TO 00-35D-54 requirements. It has been reproduced for use as an insert in this issue of our magazine.

★ ★ ★ ★ Command Line

From MAC:

THE FIRST STEP

(The new MAC Chief of Safety, Col Henry J. Bierbaum, has the following to say about safety.—Ed)

Some acts, they say in showbiz, are hard to follow. As the new MAC Chief of Safety, I find myself staring at the rapidly disappearing footprints of ex-Chief, Col Perry V. Collins, and a brand new MAC record low major aircraft accident rate of 0.76 for 1965. Topping either one will take max power all the way, and then some.

As the first step along this hazardous road I had to ask myself, "Just what *is* the safety role? Where does it *fit* into our currently accelerated operations? Are new concepts required?"

Looking for the answers led me to the work done by my able predecessors. Through long and hard experience they have proven a number of safety principles which provide a firm foundation for an effective accident-prevention effort. Always remember, they cautioned, that *safety is never an end in itself.* The goal is always to get the mission accomplished in the most effective manner possible. It's a safety job to find ways and means of doing this.

First and foremost, then, we need to know what the problems are. And that's where you come in. As an aircrew member, maintenance or support troop you are the one who is closest to our daily operations. You fly the aircraft, maintain it, load and unload it, fill it with fuel and oil, operate the various systems and do all the myriad other things MAC has to do every day. If there are any hazards involved in these jobs you should be the first to know.

Your first safety responsibility, regardless of who or where you are, is to do your job professionally, and that means safely. Your second is to report any hazards you find promptly and accurately, whether you can fix them or not. The effectiveness of an elaborate system of hazard detection and correction rests upon your conscientious discharge of this responsibility. This system requires your active cooperation around the clock.

It may be helpful to remember these obligations as three Rs: Recognize, Report, and Review.

Recognize that any procedure, any piece of equipment, can contain the seeds of an accident. Learn to look for the danger signals of minor or repeated errors, mistakes and injuries. Sooner or later, if not corected, they can result in serious accidents.

Report each and every hazard by one of the approved methods: Operational Hazard Report, Incident Report, Emergency Unsatisfactory Report or Aircraft Commander's Trip Report. Do this as promptly as you can, as accurately as you know how and as thoroughly as time permits. Keep in mind that corrective action may originate with people thousands of miles away whose sole knowledge of the hazard must come from your report. Adequate preventive action will often depend on the information you supply.

Review all completed corrective actions to see if they are doing the job. If not, report again, as often as necessary, to insure that the problem is completely solved.

We've got our work cut out for us in the months ahead. It will take, as before, a dedicated team effort to reach our goals. I'm proud to be a part of the great MAC team. I'm sure you are, too!

ENROUTE SECURITY FOR HAZARDOUS CARGO MISSIONS

Recent Nuclear Safety surveys have indicated a need for more emphasis and attention by *all* personnel in the vital area of SECURITY. At enroute stops, MAC crew members are experiencing lack of coordination and support in providing necessary guards and sometimes a lack of understanding on the part of the guards of their responsibilities concerning admittance to "no-lone zones," entry points, access lists, etc. This lack of support has been experienced at both MAC and non-MAC bases. We will be the first to reiterate that NSOs are not responsible for providing security for nuclear cargo missions. However, security is an integral part of the Nuclear Safety Program. The NSO must work closely with security personnel to insure complete effectiveness of the overall program. A good way to determine if our nuclear missions are getting the right kind of support is to monitor the arrival of a mission at your base. If you observe discrepancies or have questions about procedure, discuss the situation with the responsible people. If corrective action is warranted, get it started and then follow up to insure completeness. Often times, an informal visit or observation such as this can clear up serious misunderstandings and make the whole job a lot easier for all concerned.

DEVELOPMENT ENGINEERING INSPECTION FOR C-141 MINUTEMAN LOADING

On 6 and 7 December 1965 a Development Engineering Inspection (DEI) was held at the Lockheed Georgia Co., Marietta, Georgia, to review the procedures and equipment developed by Lockheed for the loading/offloading and airlift of the Minuteman missile on the C-141A. Representatives of the following commands/agencies were present: MAC, SAC, AFLC, ATC, ASD, BSD, OOAMA, WRAMA, DIG/IS USAF, and Boeing Aircraft Co. The DEI included a complete transfer of a Minuteman Missile Shipping and Storage Container Ballistic Missile (SSCBM) weighing 85,749 pounds from the Ballistic Missile Trailer (BMT) to the aircraft. The inspection indicated that the Minuteman SSCBM and the C-141 are compatible and that airlift is practical and feasible. After careful jacking of the aircraft, and alignment and jacking of the BMT, the SSCBM was rolled onto the aircraft and secured without difficulty in approximately 45 minutes. Tie down is accomplished by 24 tie-down bolts which are torqued to a specific value. It was obvious that precise alignment and leveling of the BMT and the aircraft are absolutely necessary to avoid difficulties during actual transfer from the BMT to the aircraft. The SSCBM rolled onto the aircraft easily using the BMT hydraulic winch. Inside clearances permit unobstructed walkways on both sides of the SSCBM; vertical clearance is limited to approximately 2 to 3 inches. Vertical clearance presented no problem during the entire loading. Inspection team members recommended many changes to the Dash 9 loading procedures and four minor changes to the jacking equipment. Lockheed will modify 32 production aircraft to accommodate the Minuteman.

From ATC:

CHANGES IN NSO COURSE STAFF

There has been a complete changeover in the staff of the Nuclear Safety Officer Course at Lowry AFB. In March Capt Ronald E. Christensen was assigned as instructor supervisor of the course vice Capt Paul F. Dudley, who was reassigned to Italy.

Officer instructors assigned are 1st Lt William A. Begalke, Jr, and 1st Lt Alan L. Behall. The NCO instructors assigned are SSgt Gary C. Stout and SSgt Harold J. Alberti.

From AFLC:

A TECHNICAL ORDER IS AN ORDER

In the Air Force an order is an order regardless of whether the order relates to combat operations, daily routine, or technical matters.

A technical order (TO) is a military order and, like any other MILITARY ORDER, must be carried out completely. Accidents/incidents involving explosives, whether on aircraft or on the ground, are often due to failure to strictly observe each and every requirement in the pertinent TO. Negligence of this sort not only endangers the lives of others and impairs or prevents mission accomplishment, but is also a grave breach of discipline.

Disregard of TOs is not widespread throughout the Air Force, but when such disregard has occurred, it has led to operational failures and even to serious accidents resulting in large losses in life, property, equipment, and capability. After the damage is done, the problem is not merely one of repairing, replacing, or of finding and taking proper action against the guilty persons, but of assuring that such accidents/incidents will not recur. In short, every necessary step must be taken to enforce strict compliance with TOs.

There is no ready answer as to why some persons change or disregard actions specified in a TO. This is a true breach of discipline. Results speak for themselves. Intentional non-compliance with TOs makes no sense at all.

Perhaps some do not understand that a TO is an unequivocal military order and not a guide which may be followed at their discretion. Others may excuse themselves by stating they found a mistake in it or that they found a better way of doing things or that conditions arose which were not clearly covered in the TO. None of these excuses is sufficient reason to violate the first demand of discipline—to follow orders until rescinded or modified by proper authority.

Like anything else, TOs are not infallible. The people who prepare these orders are usually experts in their respective fields and arrive at the specific requirements only after thorough study and coordination with all concerned. Nevertheless, experience may necessitate revisions or unforseen problems may call for deletions and additions or changes in techniques may require appropriate changes in the applicable TOs. *You don't have to live with a TO that needs a change.* There are adequate procedures for recommending and making such changes. Meanwhile, unless permission for a change has been granted, existing TOs must be complied with under any and all circumstances. In an emergency when there is no time to process a recommendation through normal channels, use the telephone or telegraph through command channels.

• • • • • • •

The need for complying with TOs must be fully understood. The problem of noncompliance will disappear once everyone understands that a TO is a military order which brooks no violation by anyone for any reason.

(Harry D. Mytinger, OOAMA/OOYSSS)

From ADC:

WHAT KIND OF A SUPERVISOR ARE YOU?

Here's a small quiz we borrowed from the Ent AFB weekly newspaper which we figured was worthy of a little cerebration by folks in our line of work.

- As a supervisor, are you the first person to whom one of your men might turn in case of trouble?
- When praising your men, do you praise only when praise is due and not to flatter?
- Do you express sympathy and honest interest in a man's cause even though you might disagree with him?
- Do you talk down to your men when giving an order—do you say "Get going" instead of "Let's go"?
- Do you club and coax or lead and coach?
- As a supervisor, do you feel that your men serve you, or their country?
- Do you attempt to keep your men informed of the future when at all possible?

All the above queries were suffixed with Zero Defects, but we take the view that they may be equally well applied to any and all managerial situations.

Removed by direction of HQ AFSEC/JA, February 2019

From TAC:

SAFETY SURVEY . . . OR INSPECTION

LT COL PAUL L. SMITH
CHIEF, SAFETY SURVEY DIVISION
HQ TAC

One of the toughest jobs we have in the survey business is to get people to talk over their problems with us. The general reaction is, "Why tell you what's wrong and then be written up for it? Go find it yourself!"

Well, Surveyors, I'm afraid we brought it on ourselves. For years we've been saying, "We're here to help you," and then we turn in survey reports crammed with tiny little nitpick items that require answers through command channels. No wonder the doors close in our faces. No commander likes to air his soiled laundry all the way up the line when he can take local action to correct the deficiency. In addition, division, numbered air force, and major air command staffs are forced to wade through a host of minor discrepancies and corrective actions when they should be concerned with only the really pertinent items. As a result the accident prevention effort is degraded in the field and at the headquarters.

How does a survey differ from an inspection? Well, first let's look at the purpose of an accident prevention survey. It is to identify unsafe conditions or trends which, if unchecked, will probably result in accidental loss of men or equipment. When a survey team identifies unsafe conditions it must provide sound recommendations to correct the deficiencies. Our purpose is not just to say, "It isn't safe, so you've got to stop it." Here we safety officers must remember that the nature of TAC's mission requires us to accept some risks in the operation. We do, however, have a responsibility to keep those risks as low as possible without restricting the mission.

For example, a base we visited last year had a construction project that made it necessary to temporarily relocate the hot brake area. Inadequate study went into the selection of the new location and it was placed directly in front of the regular hot gun area. When the first pilot with hot brakes taxied to the new area, he found a four-ship formation . . . dearming! The guy with the hot brakes was rightfully a little disturbed.

Another base had hot guns swinging through the commander's office, the hospital, and the flight line maintenance buildings . . . not once, but twice on the way to the secondary runway. A little work with the local safety officers got both of these situations changed. The mission wasn't restricted; instead it was accomplished a lot more safely.

We on the survey team pick up many ideas while covering the circuit each year. We see a lot of things that apply to other units, and we try to pass on worthwhile ideas and innovations. Exchange of information is one of the most valuable by-products of a safety survey and will serve as an effective accident prevention tool. We believe in sharing the wealth.

Our team members have two advantages when they arrive at a base. First, their business is accident prevention, and 100 per cent of their effort is directed toward that goal. They are exposed to the countless problems of each base visited and see how problems have been handled by other units. Secondly, they aren't surrounded by the workaday details that plague the local troops. They often can see the forest better because the trees aren't in the way.

Properly administered, the safety survey is an effective management tool for the unit commander. The two basic resources of a military manager are personnel and equipment. Whenever an accident erodes either, part of the unit's potential is lost. If the survey effort can find just one better mousetrap at each base to pass on to other units, the command effectiveness will be greatly improved. It will help us reach this goal if people in the field will discuss their safety problems with the team. The survey team in turn must move away from the position of inspectors and provide objective efforts (*sic*) to help commanders eliminate accident cause factors. If we are to attain the reduced accident rates we hope for in 1966, we must develop and honor a mutual confidence. Then perhaps the second half of the joke, "We're glad to have you," will become a reality.

From PACAF:

TIGER IN THE BUSH

"It was the biggest sabre-tooth tiger I ever saw," said Oog, the caveman. "He sure came close to getting me this time!"

"How big a tiger was he?" asked Oona, his wife, putting more boiled leaves on Oog's scratched back.

"Here—I'll show you," the wounded man said. He picked up a charred stick and using it as a pencil he drew on the smooth wall of the cave a crude picture of the animal that had attacked him. "See? That's what he looked like!" he said.

"Wow! What a beast!" exclaimed Oog's wife. "But how come you weren't being more careful? You know this place is just lousy with tigers—how come you didn't see this one until he jumped you?"

"Because he was hiding behind that big tree down by the pool—that's how come I didn't see him!" said Oog, clouting her across the ear. "How come you ask so many stupid questions, anyhow?"

Oona whimpered a while, and held some of the boiled-leaf poultice to her bruised ear before replying, "I just thought that since you drew a picture of the tiger you could draw a picture of some trees and things around him to show how he was hiding, and then we could get the rest of the tribe in here for a meeting, and you could show them the picture ,and then when any of them go down to the pool they'll be careful and look behind the trees to make sure there isn't a tiger hiding there, and then maybe nobody else will get clawed up like you did, Oog."

Oog clouted her on the ear again, spattering boiled leaves all over the cave. "You dopey dame!" he roared. "What good is it going to do to draw pictures and have meetings and tell people to be more careful? Do you think that drawings and meetings will change that tiger into a pretty little pussy-cat? What does he care what we say about him? What we've got to do is get a few of our best men and sharpen up our spears and go down there and eliminate that blankety-blank before he eats us all!"

Oog strode angrily back and forth, glaring at his wife and muttering to himself. "Meetings!" he snorted. "Reports!" "Warnings!" he snorted. "Be more careful! It's getting so half the idiots in this tribe think that when you've got a tiger on the loose you don't have to do anything but talk about him for a while and he'll go away. I'll tell you something, Oona," he said. "If we don't start drawing less pictures and killing more tigers we're going to have a real nice art gallery in here, but we're going to be fresh out of people!"

He sat down heavily, "I guess I shouldn't have clouted you, babe," he said. "Warning people is all right, as far as it goes. It's a good idea. But killing the tiger is a better one—and don't you ever forget it!"

SEEN ANY TIGERS LATELY?

(Col Hubert W. Gainer, Commander of the 498th Tactical Missile Group, has the following to say about "cause and effect" with regard to safety.—Ed)

Newton's laws of action and reaction were essential in the growth of our aerospace capabilities and missile development. Without these tenets we would still be earthbound creatures without the tremendous aerospace posture enjoyed today.

Not a law *per se* but equally important is the axiom of "cause and effect." This rule is applied in every aspect of our daily lives, either consciously or subconsciously. The degree of application determines how well we succeed, or how badly we fail, to accomplish the full purpose of each objective.

Since the human element is the most vital factor in each weapon system, it is incumbent upon each commander, staff officer, and supervisor to fully evaluate all actions to insure that treatment of the "cause" will achieve the desired affect. Conscious attention to this axiom prior to and during all operations is mandatory if we are to provide a high degree of safety to our personnel and equipment resources for without these resources our mission, our country, and our very lives are in jeopardy.

From USAFE:

MISSION 70 REPORT

(Col. Edward D. Leahy, Director of Safety, Hq USAFE, made the following Mission 70 report in the April issue of "Airscoop."—Ed.)

Now, into the second year of Mission Safety 70, a look at the record shows that we are progressing in the direction established by President Johnson. Last year, in this magazine, we reported the presidential safety policy: "The toll of injuries and the cost of accidents must be reduced again and again."

Mission 70 calls for an average five per cent per year reduction in accidents across the board toward a 30 per cent reduction by 1970.

For calendar year 1965, USAFE realized gains of five per cent or better in many areas. Improvement was achieved in all but two areas—major aircraft accidents and private motor vehicle fatalities. At the end of the first quarter 1966, these two areas show improvement. Provided the present trend continues, USAFE will meet or exceed the President's goal. But we should remember—no safety program will remain successful under its own momentum. It's going to require constant attention throughout the command.

President Johnson has made special identification of safety through the Mission Safety 70 program. Savings in lives and weapon systems is of concern to the highest level of command.

(CONGRATULATIONS!—Ed.)

Doc Flighty

Palomares Caper

COL JOHN A. NORCROSS

Old Doc was sitting around the house trying to get over the Yule-tide ceremonies when some idiot rang the alarm bell that says "Broken Arrow—Mod One A Plus." So the Old Doc packed his personal things and his siphon bottle with CO^2 cartridges and took off to the lovely shores of the Spanish Riveria for what has been called by some clods as a boondoggle. The clods who called it this weren't ever anywhere near Garrucha, Vera, or Palomares. But, looking back, compared with the 50 knot sand storms of the land of enchantment, maybe it wasn't such a bad place after all.

But, to regress to the story at hand, it seemed that two flying machines had pranged one another. One of the birds had on stow several nukes and had, post smash, spewed them over the sand-trap landscape that was this part of south-east Iberia. One of these fire-crackers managed to bite the soil without explosive mishap, and two bunged in with what is called in Brooklyn a one-pernt det. To translate from the Brooklynese, these two latter ones didn't add any betas, gammas or neutron to the landscape—but there was some alpha contamination spread over the local area. The fourth one eventually was found in the water of the blue Mediterranean and, unless it conked a fish on the head on the way down, didn't cause any trouble to anyone or anything.

Many thousands of words have been written about what was done on delineating areas of contamination, cleaning these areas up to the satisfaction of all concerned, and ending up with an emphatic weltschermertz with the Iberians. But the Air Force has emerged with a certain amount of confusion concerning not only what should be done with people who maybe were involved in clean-up and search measures in Palomares, but what should be done in case there is ever another alpha-contaminating Broken Arrow.

In the first place, alphies are little guys who can cause a lot of trouble within a certain area. But this area is small. A barrier as burly as the paper in a cigarette can cause the alphies to stop and desist. And even if you're a non-smoker, the alphie would only cause trouble out as far as an inch and a half at the most. In the second place, alphies can only hurt you if you get them in your lungs, or get them in your body through an open wound or by eating them. The most common way to get them is by breathing them in your lungs, if you happen to be in a Palomares-type mess. And after you get them in your lungs, the little critters get into your blood stream and end up in your lymph nodes or bones where they might cause cancer. So they aren't to be fiddled with. But, only a few of the guys that get in the lungs ever end up in the bone—so you have a pretty good chance of coming out clean even if you get a snoot full.

What Old Doc is trying to tell you is that alpha particles can be very dangerous, but so is highway traffic and smog. If you want to get your wife on the receiving end of your life insurance policy, any of the above ways will do the trick. But smog and highway traffic will kill thousands of more people than the Palomares caper will—and it would take more than a miracle for anybody who was in the Spanish TDY to meet his maker because of radiation.

So what's the big deal about radiation? Well, in the first place, radiation is mysterious. TV programs bring us up to date about the latest on detergents, soaps, hair sprays, denture cleansers, beers, and non-calorie soft drinks. But there hasn't been the first program to tell us that there is a beneficial effect from carefully calibrated doses of radiation. Not quack medicine, but well regulated and well calibrated treatments from medical specialists that can cure you of many malignant diseases.

But that's enough of this romance—so let's get to the business at hand. Today's topic concerns how to find out how much alpha contamination a guy has who has been essentially minding his own business doing things that some officer told him to do in an area that may or may not be contaminated by a one-point detonation of a large type banger. This guy could be looking for another firecracker that hasn't been found as yet—or cutting vegetation, tomatoes, beans, or whatever, from land that had been dusted by these mysterious alphies.

Almost everyone insists on knowing at once exactly how much radioactive material has been accumulated in the body that particular day. The "almost" fraction of the everyone mentioned above knows that an exact estimate of "how much" can't be even given a WAG for at least six or seven weeks after exposure. At this point, a 24-hour urine specimen will indicate how much contamination got into the body and was excreted by the kidneys after a guessed-at percentage was passed into the blood stream from another guessed-at amount that got into the lungs from inhalation of contaminated air. Getting a 24-hour specimen at the time of contamination in the field under field conditions is about as efficacious as picking your ears with boxing gloves on. Everything is contaminated, including the bottle, your hands, and whatever else is used to get a urine specimen. So the results will be completely confusing and useless, and, even if a non-contaminated specimen could be obtained, it wouldn't show anything anyway because there hasn't been time enough for the contamination to get through the lungs into the blood stream and from there into the kidneys for excretion.

Probably the best way to get a rough estimate as to whether a guy should be removed from the contaminated area is to wipe out the nostrils with a cotton swab, send it to a lab for analysis of contamination, and, if the number comes over some magic number, send the guy away from the contaminated area. This number has to be figured out to account for the amount that may have reached the lungs froṁ the air, the amount that may have hit the blood stream from the lungs, and the amount that got to the kidneys and was excreted, plus an "if" percentage and several unknown factors. The brain boys are coming up with such a number—and regardless of the unknown factors, the number will definitely be a safe one for you who got a snootful at the Broken Arrow site, any error will be definitely on the side of keeping you healthy.

Any of you who did come up with a positive number from the nose swipe will get your chance at the 24-hour bottle. But this will come later, after you have been sent back to your own uncontaminated base, and six weeks have elapsed since possible exposure. Then, and only then, will the urine results be of any value.

So Old Doc's advice to you who were TDY on the Spanish Riveria is this—if your 24-hour specimen from Palomares showed any alpha contamination, send another specimen in, and be sure to keep your insurance paid up, because you might be in an auto accident where you might need it. But don't worry about dying of radiation until you get the official letter with the black edging around it.

AEROSPACE NUCLEAR SAFETY

V. A. Blake, Jr.
Sandia Corporation
Albuquerque, New Mexico

(The opinions expressed in the following article are those of the authors and do not represent the official policy of the United States Air Force.)

In 1958 the United States placed its first satellite in an earth orbit. The signals from this satellite were heard for about two weeks, the limit of the battery supplied power. Since then the United States has put forth a major effort in space. Satellites weighing many tons have been orbited which have required electrical power plants producing as much as several thousand watts. It became apparent early in the space program that the operation of electrical payloads in space for extended periods of time would dictate that some form of solar or nuclear energy would ultimately be required.

The Atomic Energy Commission, in the early 1950's studied a number of nuclear energy power source concepts from the veiwpoint of establishing their feasibility for use in future spacecraft. Both reactors and radioisotope generators were considered. Although ground-based reactors are inherently large and heavy and require massive shielding, it appeared possible that smaller compact versions could be designed for space use. Likewise, the high specific power available from several of the radioisotope materials made it probable that reasonable power levels could be obtained from isotope power sources.

The first space atomic power source was demonstrated in 1959. Called the SNAP-3, this isotopic generator used Polonium-210 as a fuel, weighed four pounds and produced in excess of 2½ watts of power for 90 days. The total power available from this four pound unit was equivalent to nearly one ton of nickel cadmium batteries. In 1961 a version of the SNAP-3 generator fueled with Plutonium-238 was used to power a portion of two navigational satellite systems. One of these nuclear powered systems is still operating. The condition of the other is unknown since it ceased transmitting after eight months of operation, apparently due to an electronic failure.

Starting in 1963, larger plutonium fueled isotope power supplies were flown on three navigational satellites. These power supplies were designed to develop 25 watts for five years. Two of these are still in orbit while a third was destroyed as a result of a failure of the missile to place the satellite in orbit.

In 1965 the first reactor power supply, designated SNAP-10A, was placed in orbit around the earth. This unit produced in excess of 500 watts of electrical

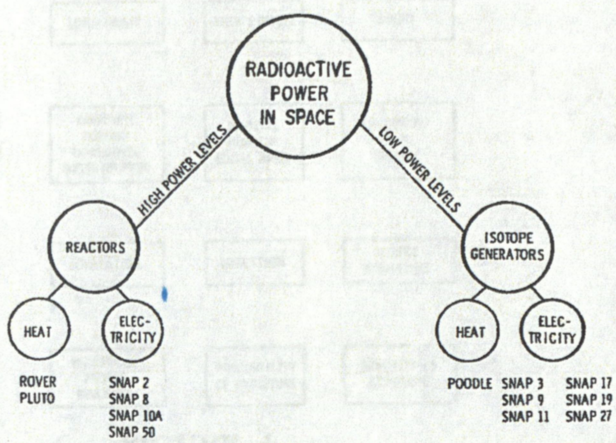


FIGURE 1

power for a period of 43 days. The reactor was then apparently shutdown by an onboard sensor which malfunctioned. Until shutdown, the power supply performance exceeded expectations.

These systems are members of a family of atomic power supplies designed for use in space. Figure 1 shows the different systems under development. The left side of the chart shows the higher powered systems which are reactors and include units to produce heat as well as those to produce electricity. The right side of the chart shows the lower powered systems, again divided between those to produce heat and those to produce electricity. Figure 2 gives the characterization of the various systems including weight, fuel, and power level.

There is some hazard associated with the use of radioactive materials as an energy source. This is

SNAP, POODLE AND ROVER DATA

SNAP	WEIGHT (lbs)	APPROXIMATE SIZE O. D. x HEIGHT(in.)	FUEL	POWER OUTPUT	LIFE/MISSION TIME
2	1470	----	U-235	3 KWe	1 YEAR
3	4	5 x 6	Po-210/Pu-238	3 We	90 DAYS
8	1500-4500	30 x 50	U-235	30/60 KWe	1 YEAR
9A	27	20 x 10	Pu-238	25 We	5 YEARS
10A	1000	60 x 120	U-235	500 We	1 YEAR
11	30	20 x 12	Cm-242	25 We	90 DAYS
17	30	10 x 36	Sr-90	25-30 We	5 YEARS
19	30	20 x 11	Pu-238	30 We	5 YEARS
23	900	25 x 25	Sr-90	60 We	5 YEARS
27	30	17 x 18	Pu-238	50 We	5 YEARS
POODLE	30	4 x 17	Po-210	5 KW	----
ROVER/ NERVA	8500	52 x 96	UC_2	1000MWT	----

FIGURE 2

also true of other useful energy sources, like steam or gasoline. The public has learned to accept certain safety precautions in order to benefit from these more common energy sources, and a similar pattern will evolve with radioactive materials.

The ability of any nation to successfully pursue the exploration of space is most certainly governed by the amount of electrical energy which can be delivered by space power supplies. Figure 3 shows a spectrum of power levels versus lifetime for various space systems. The higher levels of power can be met only by use of reactors. Clearly, there is no competition with atomic energy in this area. In the high intermediate levels, solar dynamic systems, isotope dynamic systems, or reactor systems, all using rotating machinery for energy conversion, can meet the power levels. The low intermediate power levels can be

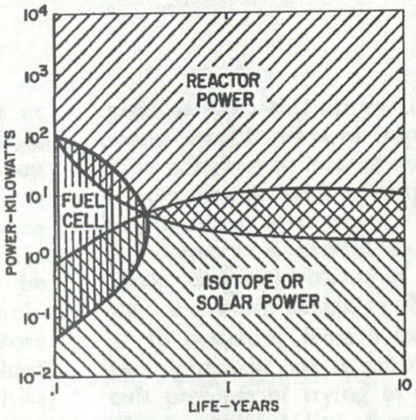


FIGURE 3

handled by either solar static or isotope static systems.

Considering the broad spectrum of capability, nuclear energy will certainly prove to be indispensable in space. Safety probably represents the greatest deterrent to the extensive use of nuclear power in space thus far. Safety is not something that just happens. It must be carefully thought out and positive steps taken to achieve it.

The next chart, Figure 4, is shown to present in the form of a multiple path array, a simplified version of the overall aerospace nuclear safety problem. Given a launch, the chart shows that the flight can result in one of three things. Either the missile achieves a successful orbit, or a short orbit, or it aborts. By definition, all possible eventualities of an attempted launch can be made to fit into one of the blocks. The sum of the probabilities in any row is

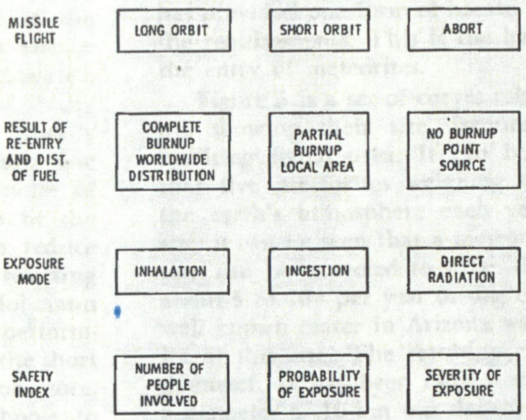


FIGURE 4

one. The number of blocks in this row can be as many as desired as long as the sum of probabilities totals one. The second row shows what can happen as a result of reentry. Again, every eventuality is covered in this row. The third row shows the form the resulting exposure may take. The final row is a safety index which consists of three items to be evaluated; the number of people involved, the probability of exposure, the severity of exposure. More will be said later about this safety index. The chart is used to illustrate a systematic method of analysis which will cover all the possible consequences of a flight. There are 27 different paths through this array of blocks which must be considered and for which a safety index should be evaluated. For an actual system, the number of paths will be more than represented by this array. Some systems can involve several thousand separate paths depending on the number of rows and columns necessary to describe the mission. It is important to note that the probability of exposure is never zero along any path so that some evaluation will always be necessary. For example, a power supply designed to reenter intact has some finite possibility of burning up and it may in fact develop that the greatest potential hazard exists along this undesired path.

When the important critical paths are isolated, then attention can be given to these areas to reduce the potential hazard by reducing the number of people involved, the severity of the exposure, or the probability of occurrence (the three items in the safety index).

The primary approach to the safe use of isotope power in space has been the selection of orbital altitudes that have a long lifetime relative to the half-life of the isotope. Ten half-lives will reduce the isotope inventory by a factor of 1000. However, in attempting a launch, there is some probability that a short orbit or an abort will occur. Usually the more hazardous situations can arise along one of these paths. If the short orbit path, because of its random reentry characteristic, proves to be the most critical, the designer may be able to reduce the probability of incurring a short orbit by selecting a ballistic ascent into orbit rather than a Hohmann transfer. Although a reduction in missile performance is incurred, the probability of being in the short orbit may be reduced by a factor of 100 or more. Or, as an alternative, the designer may choose to reduce the random character of a short orbit reentry by including a command deorbit system with the atomic power supply to achieve reentry where desired. Gains in safety, by a factor of 10 to 100 are possible with this approach. These are only two of many possible ways of improving the safety picture. The designer is limited only by his own ingenuity in developing safer systems. In some instances the situation may arise where a switch in design approach is necessary. A careful analysis may show that an intact design involving a given fuel form is safer than a burnup design or the reverse may be true.

In switching from a burnup approach to an intact approach, one is confronted with the very difficult problem of trying to compare the acceptability of a low probability of exposing a small number of people to a high level of hazard, with a higher probability of exposing a large number of people to a low level of hazard.

The rest of this article will be devoted to some thoughts on this subject that may eventually form a basis for criteria which can be used to make such judgments. Earlier, you will recall, I indicated that the terminal evaluation of the array of the multiple path chart is a safety index involving the number of people exposed, the probability of exposure, and severity of exposure. What is needed to form the basis for an approach to this problem is a naturally occurring hazard that is readily acceptable to the world's population, but at the same time has the potential from a single incident of involving a large segment of people. Typhoons, hurricanes, tsunamis, or earthquakes, seem at first to fit the criteria; however, even though they often involve a number of people they certainly could not be classified as "acceptable" since no one would agree to an operation which had any probability of causing casualties at the rate of any of these natural accidents. Nature has provided one form of hazard that does seem to fit the requirements. This is the hazard associated with the entry of meteorites.

Figure 5 is a set of curves relating to iron meteorites showing their size, frequency of arrival, and resulting lethal area. It can be seen, for example, that five meteorites weighing ten tons each enter the earth's atmosphere each year. Picking another size, it can be seen that a meteorite weighing 100,000 tons can be expected to strike the earth at a rate of about 5 to 10^{-4} per year or one every 2000 years. The well known crater in Arizona was made by a meteorite of this size. The resulting crater was 1.2 km in diameter. It has been estimated that all life within a diameter of 10 km was destroyed as a result of this impact. The newspapers recently noted that an asteroid named Ictharus will pass within 4½ million miles of the earth in the summer of 1968. This asteroid, which revisits the earth every 19 years is about

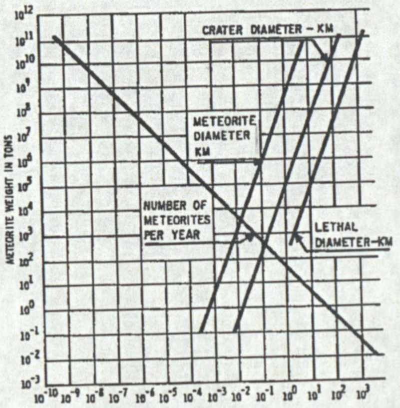


FIGURE 5

one mile across and will weigh in the vicinity of 10 billion tons. The chart shows that the crater from this meteorite, should it ever strike the earth, would be perhaps 100 km in diameter while the lethal area would cover a diameter in the range of 1000 km. There are two craters in Africa that are 25 and 40 km in diameter, providing evidence that large meteorites do strike the earth. A book on the subject of meteorites states that evidence indicates the earth has been bombarded throughout geological time by meteorites and there is no reason to believe it will not continue. It is noteworthy that a ton of meteoritic material traveling at meteorite velocities represents the kinetic energy of 10 tons of high explosive.

From these curves, and the population distribution on the earth, the curve shown in Figure 6 was derived. It shows the relation between the number of people that could be killed from a given size meteorite striking the earth and the probability of that event happening. It shows, for example, that the probability of one death per year is about one in 300 while the probability of as many as eight million people being killed is about one in one billion. In spite of the fact that about ten meteorites strike the surface of the earth each day, there apparently has never been a death attributed to a meteorite. An individual's personal hazard is remote, being about one chance in 10^{-11} of being struck in any given year.

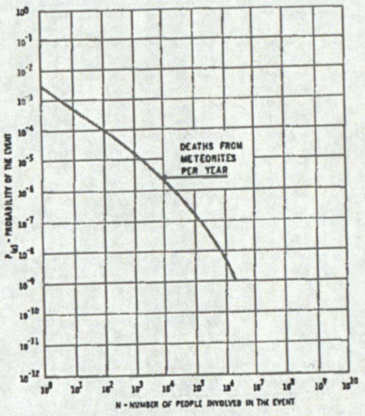


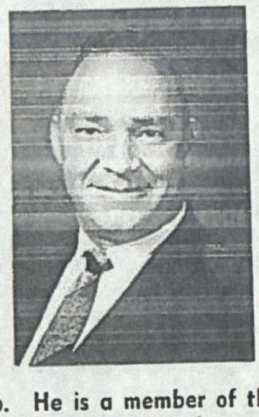
FIGURE 6

Again, referring to the last row of the multiple path chart, the three items suggested for consideration in the safety index were the number of people involved, the probability of exposure, and severity of exposure. As can be seen, Figure 6 provides a form of a safety index guide for the most severe possible exposure from a naturally occurring hazard. It seems reasonable to assume that this could also prove to be a quite acceptable guideline for a man-made hazard. It should be possible to draw other curves on this chart which can represent other levels of exposure (severe injury, slight injury, 100 roentgen equivalent man (rem), 25 rem, maximum permissible body burden, etc.). If the curves for other levels of exposure can be added, the chart could form a basis for safety design as well as evaluation.

REFERENCES

1. Edrington, T. S., *Ballistic Ascent to Orbit as a Means of Enhancing Nuclear Safety*, SC-RR-65-618, April, 1966.
2. Hawkins, Gerald S., *Meteors, Comets, and Meteorites*, 1964.
3. *Big Asteroid Will Pass Close to Earth in 1968*, Albuquerque Journal, August 22, 1965.

ABOUT THE AUTHOR



Mr. V. A. Blake, Jr., is manager of the Albuquerque Sandia Corporation's Aerospace Nuclear Safety Department. He joined the laboratory in 1947 as a staff member. Prior to that he was a field engineer at the New Mexico School of Mines.

Mr. Blake has both a B.S. and an M.S. degree in Mechanical Engineering which he earned from the University of New Mexico. He is a member of the American Society of Mechanical Engineers, and a registered professional engineer in the state of New Mexico.